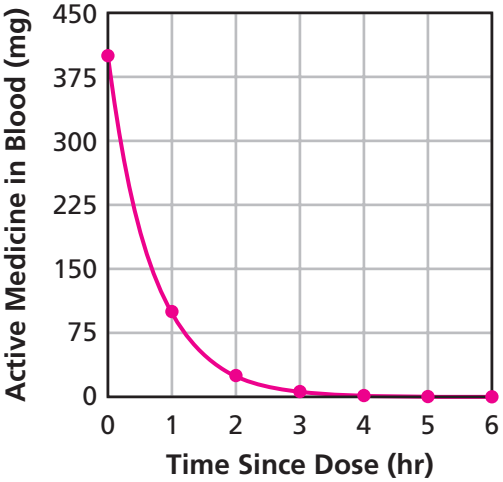
After an animal receives a preventive flea medicine, the medicine breaks down in the animal's bloodstream. With each hour, there is less medicine in the blood. The table and graph show the amount of medicine in a dog's bloodstream each hour for 6 hours after receiving a 400-milligram dose.

Breakdown of Medicine



Breakdown of Medicine

Time Since Dose (hr)	Active Medicine in Blood (mg)
0	400
1	100
2	25
3	6.25
4	1.5625
5	0.3907
6	0.0977

Problem 4.2 Representing Exponential Decay

A. Study the pattern of change in the graph and the table.

1. How does the amount of active medicine in the dog's blood change from one hour to the next?

2. Write an equation to model the relationship between the number of hours h since the dose is given and the milligrams of active medicine m.

3. How is the graph for this problem similar to the graph you made in Problem 4.1? How is it different?

B. 1. A different flea medicine breaks down at a rate of 20% per hour. This means that as each hour passes, 20% of the active medicine is used. The initial dose is 60 milligrams. Extend and complete this table to show the amount of active medicine in an animal's blood at the end of each hour for 6 hours.

Breakdown of Medicine

Time Since Dose (hr)	Active Medicine in Blood (mg)
0	60
1	■
2	■
⋮	⋮
6	■

2. For the medicine in part (1), Janelle wrote the equation $m = 60(0.8)^h$ to show the amount of active medicine m after h hours. Compare the quantities of active medicine in your table with the quantities given by Janelle's equation. Explain any similarities or differences.

3. Dwayne was confused by the terms **decay rate** and *decay factor*. He said that because the rate of decay is 20%, the decay factor should be 0.2, and the equation should be $m = 60(0.2^h)$. How would you explain to Dwayne why a rate of decay of 20% is equivalent to a decay factor of 0.8?

ACE Homework starts on page 53.

4.3 Cooling Water

Sometimes a cup of hot cocoa or tea is too hot to drink at first, so you must wait for it to cool.

What pattern of change would you expect to find in the temperature of a hot drink as time passes?

*What shape would you expect for a graph of (*time, drink temperature*) data?*

This experiment will help you explore these questions.

Equipment:

- very hot water, a thermometer, a cup or mug for hot drinks, and a watch or clock

Directions:

- Record the air temperature.
- Fill the cup with the hot water.
- In a table, record the water temperature and the room temperature in 5-minute intervals throughout your class period.

Hot Water Cooling

Time (min)	Water Temperature	Room Temperature
0		
5		
10